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## OVERVIEW OF THE MODERN CHINESE SCIENCE THROUGH THE PRISM OF THE “CHINESE DREAM”

Recent events in the world and radical changes in the development of human civilization have once again proved the importance of the concept as “science”. The article examines how the People’s Republic of China develops science and innovation to realize the concept of the “Chinese Dream”. Until now, on the world market, China’s industrial export policy has been carried out through the expansion of its cheap goods. This strategy is no longer effective in the competition. This is due to the need for high-tech production: the creation and development of high-quality products. The current economic growth and the current foreign economic situation, the accelerated modernization of the Chinese economy are favorable on a modern technological basis. The introduction of a complex of high technologies in organizations and mechanisms representing the national innovation system and industry is reflected in the search and updating of new products and technologies in the form of scientific knowledge.

The article is based on the principle of the scientific and technological development of China in the political, economic, trade, humanitarian spheres, taking place in the modern world. In addition, some issues of Kazakh-Chinese bilateral cooperation in the field of science were analyzed. The paper were used the theory of “soft power” in international relations and the Chinese concept of “harmonious world”.

**Key words:** People’s Republic of China, theoretical foundations of China’s foreign policy, “Chinese dream”, soft power.

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### «Қытай арманы» призмасы арқылы қазіргі қытай ғылымына шолу

Әлемдегі орын алып отырған соңғы оқиғалар мен адамзат өркениетінің дамуындағы түбегейлі өзгерістер «ғылым» түсінігінің ең маңызды екендігін тағы бір рет нақты дәлелдеді. Мақалада «Қытай арманы» түсінігіне жету жолында Қытай Халық Республикасы ғылым және инновацияны қалай дамытып отырғандығы талқыланады. Осы уақытқа дейін әлемдік нарықта, Қытай өнеркәсіптік, экспорттық саясаты, экспансиясы өзінің арзан тауарлары арқылы жүзеге асырылып отырды. Қазіргі уақытта, бәсекелестік күресте, бұл стратегия тиімді емес. Себебі, жоғары технологиялар базасына қажет өндіріс: жоғары сапалы өнімді құру және дамыту. Қазіргі уақытта байқалған экономикалық өсу мен қалыптасқан сыртқы экономикалық конъюнктура, жеделдетілген жаңғырту қытай экономикасының қазіргі заманғы технологиялық негізде қолайлы болып отыр. Ұлттық инновациялық жүйені және өнеркәсіпті, жоғары технологиялар жиынтығын білдіретін ұйымдар мен механизмдерді жүзеге асыруы ғылыми білім түрінде жаңа өнімдер мен технологияларға ұмтылуы мен жаңаруынан көрінеді.

ҚХР бүгінгі ғаламда болып жатқан саяси, экономикалық, сауда, гуманитарлық салалардағы орнын анықтау, ғылыми-техникалық тұрғыдағы дамуының ұстанымы мақаланың өзегін құрайды. Сонымен қатар, ғылым саласындағы Қазақстан-Қытай екіжақты серіктестігінің кейбір мәселелері талқыланды. Мақаланы жазу барысында Халықаралық қатынастардағы «Жұмсақ күш» теориясы мен Қытайлық «гармониялық әлем» концепциялары пайдаланылған.

**Түйін сөздер:** Қытай, Қытай сыртқы саясатының теориялық негіздері, «Қытай арманы», жұмсақ күш.

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### Обзор современной китайской науки через призму «Китайской мечты»

Недавние события в мире и радикальные изменения в развитии человеческой цивилизации еще раз доказали важность науки. В статье рассматривается, как Китайская Народная Республика развивает науку и инновации для реализации «китайской мечты». До сих пор на мировом рынке промышленная экспортная политика Китая осуществлялась за счет экспансии его дешевых товаров. В настоящее время в конкурентной борьбе эта стратегия уже неэффективна. Это связано с необходимостью высокотехнологичного производства: создание и развитие высококачественной продукции. Текущий экономический рост и текущая внешнеэкономическая ситуация, ускоренная модернизация китайской экономики благоприятны на современной технологической основе. Внедрение в организациях и механизмов, представляющих национальную инновационную систему и отрасль, комплекса высоких технологий находит свое отражение в поиске и обновлении новых продуктов и технологий в форме научных знаний. В основе китайской мечты лежит принцип научно-технического развития Китая в политической, экономической, торговой, гуманитарной сферах, что и происходит в нынешнем современном мире.

Авторами, кроме того, были проанализированы некоторые вопросы казахстанско-китайского двустороннего сотрудничества в области науки. При написании статьи были использованы теория «мягкой силы» в международных отношениях и китайская концепция «гармоничного мира».

**Ключевые слова:** КНР, теоретические основы внешней политики Китая, «Китайская мечта», мягкая сила.

## Introduction

Science is one of the most significant and promising areas of society. The modernization of any modern society largely, if not the main thing, depends on the development of science. Each country cares about the development of science: it allocates funds for research, strengthens the material base, and trains personnel. Today, China is confidently taking the leading position in the world in the field of research and development (R&D). In the first decades of the twenty-first century it essentially turned into a global locomotive of scientific activity.

Modern China is rapidly turning into a high-tech dominant country. Of course, for a number of key parameters, China is still significantly behind the United States, but this gap is steadily narrowing, indicating a systematic approach by the Chinese leadership to the problems of science and technology.

At the beginning of the year, the National Science Foundation (NSF) issued the report Science and Technology Indicators, which indicates that: “the position of Chinese science and technology is becoming increasingly visible in the world; China has already become the second-largest power in the world of R&D. The country ranks second in the world in terms of indicators such as investment in research and development, the release of scientific publications, and the increase in high-

tech production, the first in the world to ensure that scientific and engineering talent, and first place in the global wind energy industry” (*NSF report*).

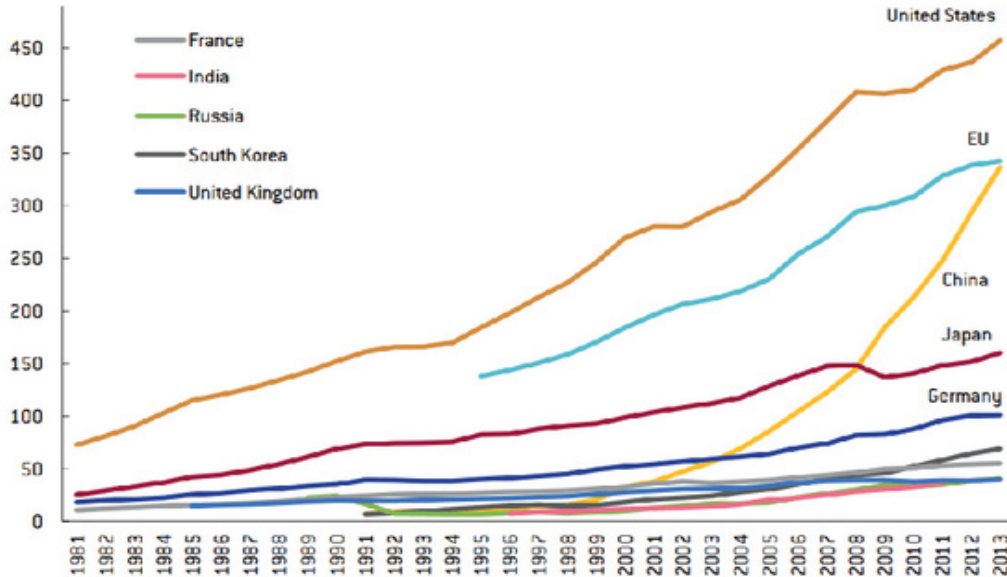
The “Indicators of Science and Technology” noted that global spending on research and development shows an upward trend, mainly concentrated in North America, Europe, East Asia and Southeast Asia. The USA remains the leader of the region; China takes the second place, approaching the EU indicator for total R&D expenses (OECD, 2020).

It should be noted that in 2015, a large-scale program “Made in China 2025” was launched in China. Thus, a course was taken on the full support of the domestic manufacturer.

**Theoretical and methodological bases.** It is obvious that it is very difficult to fully reveal the essence of various processes and political events with the participation of China on the international stage, both scientifically and politically. On the other hand, these world-class trends cannot be explained in terms of any theoretical direction in which the theoretical foundations of China’s foreign policy are formed. After all, no theoretical school can fully reveal and accurately describe the essence of international trends under the influence of China. Therefore, several theories of international relations were used in the study to consider the theory and practice of China’s foreign policy in the context of the impact on the international economy. The theory

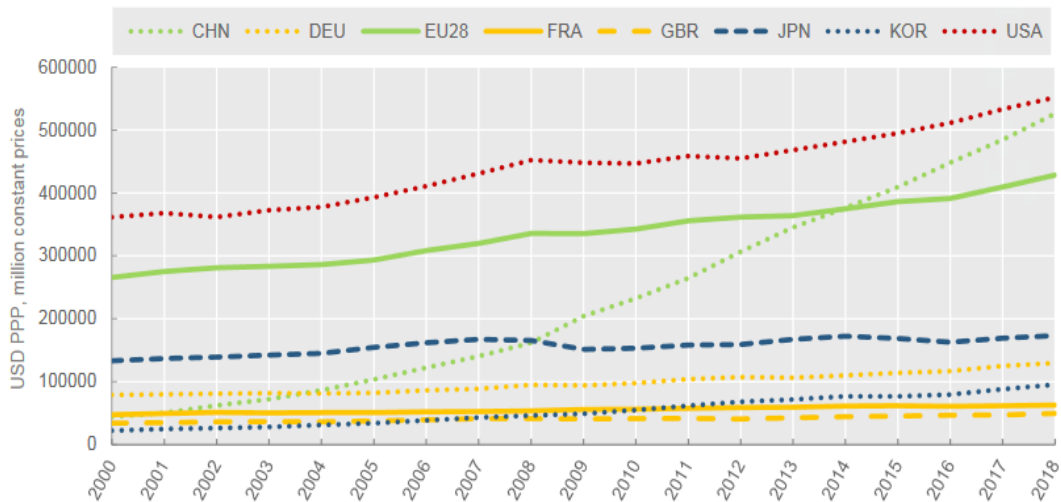
of political realism or neo-realism was used in the study of the foreign policy of the country and the policy of Chinese leaders before the presidency of Xi Jinping, who acted primarily on the basis of their national interests in the international arena. The previous generation of Chinese leaders retained the

concept of treating states as the basis of international politics. On his collected work, he has several time mentioned about the “Chinese dream”, the great revival of Chinese nation, and how to achieve this goals. He underlined the impact of the science in this long-term strategy (Jinping, 2014a; 2017b)



Source: Bruegel based on NSF (2016). PPP = purchasing power parity. NOTES: Foreign currencies are converted to dollars through PPPs. Some country data are estimated. Countries are grouped according to the regions described by The World Factbook, [www.cia.gov/library/publications/the-world-factbook/](http://www.cia.gov/library/publications/the-world-factbook/).

### Gross Domestic Expenditure on R&D, 2000-18



Source: OECD Main Science and Technology Indicators Database, 28 February 2020. <http://oe.cd/msti>

However, China's rapid economic growth, the impact and influence of the Chinese economy and science on international processes, China's increasing political activity, competitive cooperation with major world powers, China's becoming the world's largest consumer and producer, thereby increasing its active involvement in global events. Requires the use of "globalization" theory. This theory allowed us to consider and study China's strategy in relation to international globalization and integration processes, to analyze ways to realize the geopolitical and geoeconomic interests of China.

The study of the foreign policy principles of the fourth generation of leaders and Hu Jintao's idea of creating a "harmonious world" used the concepts of power in modern theory of international relations (Jintao, 2012). The concept of "soft power", founded by Joseph, Nye (Joseph S., 2005) is recognized as one of the leading theories in modern world politics and diplomacy. Soft power as a theory of indirect influence on states and other actors of international relations through ideological and cultural means is firmly entrenched in modern political vocabulary.

An objective principle was used to reflect the position and economic influence of China in international relations. It has become the basis for the study of information, research and data from different perspectives related to the research topic.

A systematic approach was used as a theoretical and methodological basis for the study of international relations. Systematic analysis, a synthesis of dialectical methods that allow to recognize the general methods of research, to monitor their changes and development, as well as a set of cognitive-mapping methods that allow to structure the problem under study as a complex system of many interrelated elements. The most widely used form of interdisciplinary research methods, including research conducted by representatives of various sciences (political science, sociology, economics, international law), was used in the conduct of research.

In addition, the paper used a historical and analytical method aimed at studying the foreign policy and economic relations of China with other countries. The use of this method allowed to study the causes of problems arising from the development of China's foreign economic relations in the system of international relations. The diversity of data and information related to the research topic necessitated the use of methods of critical analysis, collection and sorting. These methods helped to use the collected data systematically, to increase the level of accuracy through the comparison of information.

## Discussion

On May 20, 2016, the "State Program on the Strategy for Innovative Development" was published. According to the document approved by the Central Committee of the CPC and the State Council of the PRC, by 2020 China will become one of the countries of the innovation type, by 2030 it will become a leader in innovation, and by 2050 it will become the leading world power of scientific and technological innovation (Baizakova, 2020). This program provides for the promotion of innovations in the industrial technology system, the strengthening of primary innovations, the optimization of regional innovation placement, and the implementation of important scientific and technical projects, the training of highly qualified personnel.

For decades, the United States has been a leader in the production of scientific knowledge, both in the quantity and quality of publications in peer-reviewed journals, but now China publishes more than any other country, not counting America. In addition, its share in published articles in the field of computer science and technology is especially noticeably increasing. Moreover, in many indicators of scientific activity, it is almost on a par with Japan.

In addition, the Celestial Empire is a leader in the preparation of graduates in natural sciences and engineering specialties. Almost a quarter of the initial university degrees in science and technology around the world today are awarded in the PRC. And it should be noted that leading Chinese universities in international rankings are superior to al-Farabi Kazakh National University, which is considered the best in the Kazakhstan. Moreover, Peking University is generally included in the world Top 30 (KazNU – only in the Top 165). Without a doubt, the Chinese army of highly skilled specialists is a good reserve for the future.

The example of China's interaction with other world technological centers shows that national adaptation systems and technology generation have specifics related to the Chinese national identity character such as culture, history, economy and size of the country, and a considerable part of the scientific-innovation and technical potential works directly to solve, to help, to minimize the national problems. Moreover, in large countries, it is possible to gradually squeeze out products created within the GVC from domestic markets, export them, and replace them with products of domestic manufacturers with the active participation of national science and technology in this process.

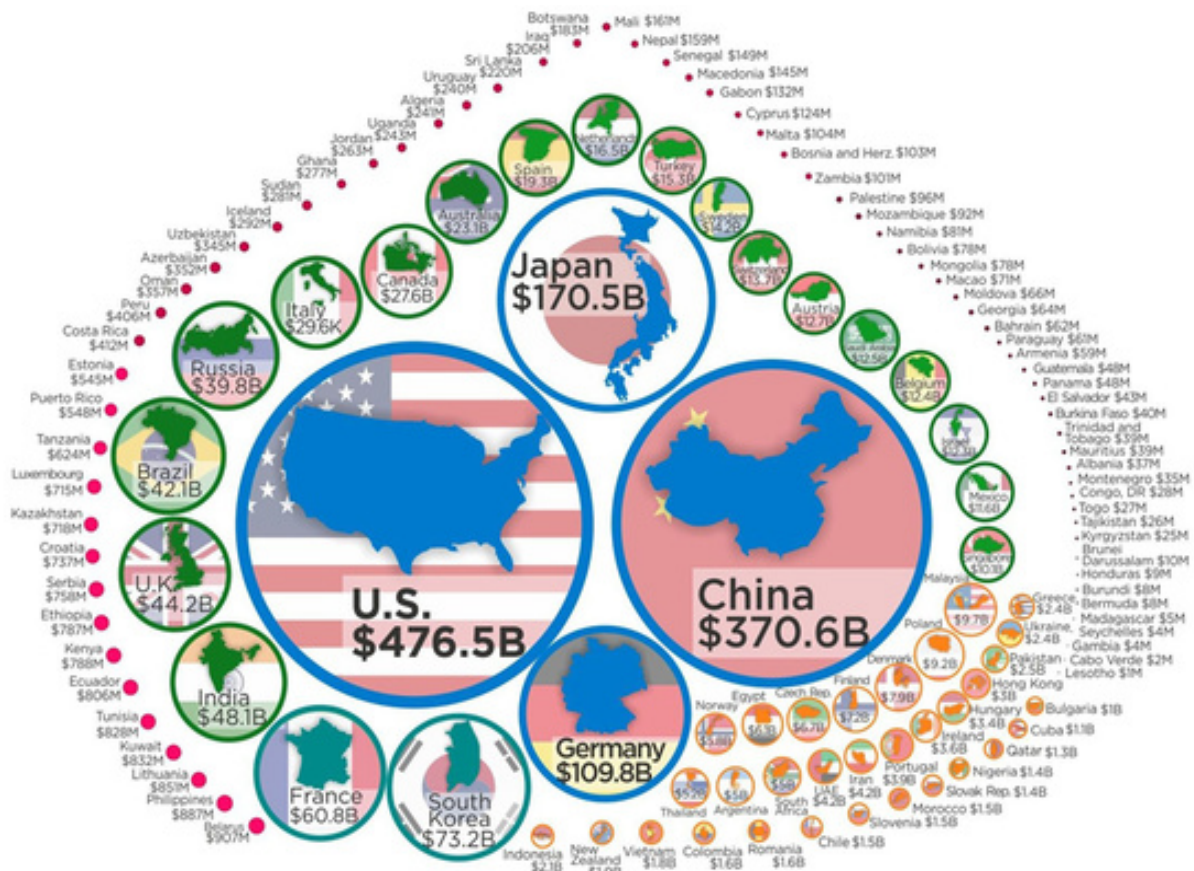
Every time when we investigating or analyzing the issues related with China, we have to take into consideration about of the mentality of the Chinese nation.

Based on purchasing power parity and global research and development spending, China’s share is about 20%, second only to the United States (27%). Japan is in third place, with a share of 10%; Germany in the fourth, with a share of 6%.

According to the World Intellectual Property Organization (WIPO), in 2014 Chinese enterprises filed 25,539 applications for international patents,

which is 18.7% more than in 2013. According to this indicator, China was second only to the United States (61,492 applications) and Japan (42,459 applications) (WIPO, 2019).

In 2016, 43 168 applications were filed from China to the International Patent Cooperation Treaty (PCT), which is 44.7% more than in 2015. According to this indicator, China lost only to the United States (56 595 applications) and Japan (45,239 applications). According to WIPO forecasts, in the next 2 years, China may become a world leader in the number of applications for patents through the PCT.



According to the People’s daily, in 2016, Beijing ranked second in the world in terms of the number of valuable technology startup companies after the US Silicon Valley. In general, the number of so-called “Unicorns” (technology startup companies worth more than \$ 1 billion) in China reached 40 units. These “unicorns” make up 50% of such companies in China, with a total value of \$ 146.2 billion, including three “super-unicorns”, which are estimated at more than \$ 10 billion. For example, the smartphone manufacturer Xiaomi Inc. (“Xiaomi”)

is estimated at \$ 46 billion and takes 1st place in the PRC. The \$ 18 billion Meituan-Dianping search engine follows it. China’s largest mobile app to call the Didi Quaidi machine is estimated at \$ 16.5 billion (Miller. 2017).

Russian military expert I. Plekhanov notes that in recent years China has been actively investing in US startups working on rocket engines, sensors for marine drones, flexible electronics for aircraft, robots, and artificial intelligence. This cause’s serious concern in the USA, as the possession of

such technologies allows accelerating the military-technological development of China.

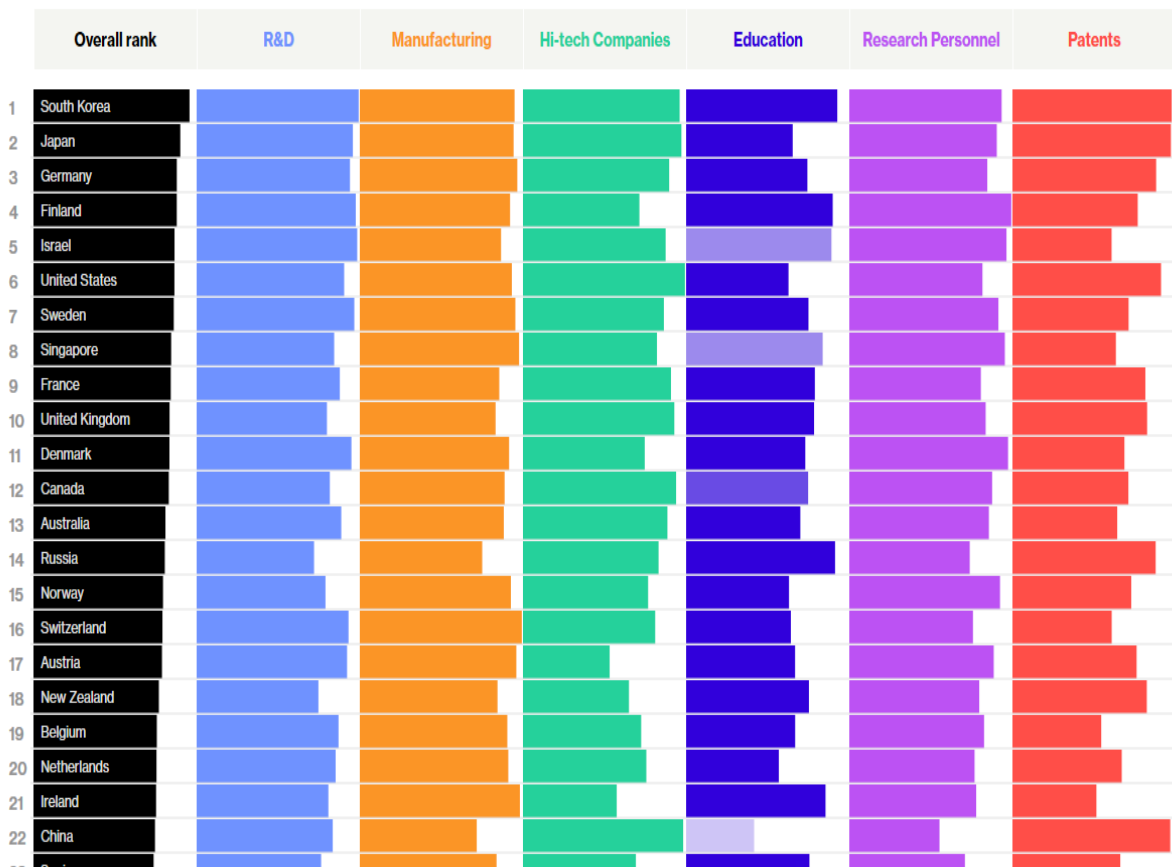
However, not all experts agree to recognize China as a global leader in innovation.

An investigation by Bloomberg showed that China, which in 2010, ahead of Japan, became the world leader in the number of patents granted, is engaged in mass posts. Most of the patented Chinese “inventions” are useless. For example, in 2016, Chinese inventors issued 1.2 million national patents (the United States – 295.3 thousand, Japan – 260.2 thousand and South Korea – 163.4 thousand patents), and in the past 1.8 million were issued to inventors evidence. At the same time, unlike international, Chinese patents are issued very simply, and the registration fee for the invention is low.

Bloomberg found out that in China there are three types of patents: documents for the present inventions (they are drawn up carefully and have commercial value), patenting a “utility model” (it is difficult to call this a real technological novelty) and patents for the design of various products. The first 23% of the total number, the second – 53%, and the third – 24%. Moreover, in the second and third categories, patents are protected for 10 years and from the second five-year plan, the fee for maintaining those increases significantly. The agency found that 91% of design patents did not renew after the first 5 years, so they can safely be called useless “inventions”. 61% refuse to renew patents for “utility models” after 5 years, and 37% of owners of real inventions (Bloomberg, 2015).

## The Results

Here are all the categories together. A country's overall rank is the average of the six measures. Faded bars indicate a country for which there isn't complete data. You can click the title of any column to re-sort the list by that measure.



An example of a Chinese design patent is the shape of a soda bottle, and a “useful model” is a sliding gesture to unlock a smartphone. In most

cases, Chinese patents are meticulously copied American patents. Experts consider this a “cost of a planned economy”: Xi Jinping’s announcement

of the “Made in China 2025” program led Chinese businesses to set about proving the country’s superiority by patenting everything. In addition, Chinese patent companies grant tax exemptions and government subsidies.

By the way, another indicator by which China has overtaken the West is the number of scientific publications. Experts believe that, given the scientific papers published in China itself, and those that were written by Chinese scientists living abroad, Chinese authors already own a third of all publications in the field of exact sciences in the world, although the quality of Chinese scientific publications is much lower than that of American ones.

The modern Chinese Academy of Sciences (CAS) was established in 1949, shortly after the formation of the PRC. At the same time, 16 research institutes and 6 laboratories were subordinate to her, and the staff consisted of 224 researchers. In the late 1950s there were more than 800 research organizations in the country. By the turn of the 1970s and 1980s their number, including design organizations, increased to 4000. 300 thousand people were employed in them, including 130 thousand scientists and engineers. At that time, 23 thousand scientists worked at the Chinese Academy of Sciences, excluding social scientists, transferred to the Academy of Social Sciences created in May 1977 (on the basis of the Department of Philosophical and Social Sciences of the CAS) 2. In subsequent years, especially during the implementation of Deng Xiaoping’s reforms, science received a new impetus in its development.

The turning point in the development of science in China was the decision of the leaders of the nation announced in 1978, well-known as the “modernization of the four” – industry, agriculture, science and technology, the armed forces. At the same time, Deng Xiaoping emphasized that science and technology can help for national economy building as the first essential tools. The “Program of Four Modernizations” was based on a policy of openness to the best international practices, the use of the best achievements of science, technology, and the attraction of foreign capital in combination with one’s own development of the country. The peculiarity and prerequisites for modernization of the country is that it is based on values that primarily generate growth: a strong work ethic, a high level of savings and an emphasis on education.

At the same time, the state policy of the PRC adhered to the concept of restricting the import of obsolete or secondary technologies into the country, in every possible way encouraged the creation by

foreign corporations of scientific and research centers directly on the territory of the PRC.

Along with zones of economic development at this stage of modernization, special zones of the development of new and high technologies – national technology parks – played a significant role in the development of high-tech and science system. Despite great difficulties (lack of financial resources, necessary scientific and technical developments), China, using capital and information from nearby Hong Kong, scientific and technical support of the domestic Academy of Sciences, in 1995 in Shenzhen proceeded to create the country’s first technology park. At the very late time of the end of the XXI century’s first decade China already operated 53 national technology parks created by decision of the State Council of the PRC, 30 parks at universities, 50 provincial parks and 466 business incubators.

For the development of scientific-innovation sphere and high-tech in China, their legislative design and stimulation was of great importance. In the conditions of emerging market relations, the successful development of science, technology, as well as the economy as a whole, is directly related to the availability of an appropriate effective legal mechanism. In this context, the adoption of the Law “On Support of Science and Technology” in 1992 by the State Council of the PRC played an important role in the process of the formation of science in the context of reforms.

In 1993, the “Law of the People’s Republic of China on Scientific and Technical Progress” was adopted and entered into force, in which the goals, role, financial sources and a system of stimulating scientific and technological development were determined. Less than ten years later (June 2002), another important document, the PRC Law on the Dissemination of Scientific and Technical Knowledge, was published.

The idea of practicality and visualization of Chinese science is being introduced into public consciousness. Science is actively popularized through the media. It is known that China is a world leader in the number of popular science films and programs. It is no accident that science in China is perceived as a public good, and traditionally high respect for the scientific class is reinforced by social measures (including remuneration).

An important factor for the development of scientific-innovation sphere and high-tech in China is government funding. Since the time of the reform, the Chinese government has allocated ever-increasing amounts of financial resources to science and technology. At the turn of the 1970s and 1980s

expenditures amounted to more than 6 billion yuan (approximately 5% of the state budget and 1.5% of GDP). After a decade and a half, government spending on science and technology increased fivefold – 30 billion yuan (although in relative terms it decreased, amounting to about 4.5% of budget expenditures or 0.5% of GDP).

According to statistics, in the PRC since the mid-1990 there was a steady increase in the share and volume of R&D expenditures in GDP. In 1995, this share was 0.57%, in 2000 – 0.9%, in 2005 – 1.3%, in 2010 – 1.75%, in 2014 – 2.09 %.

Speaking at the 5th session of the 12th convocation of the NPC on March 5, 2017, the Premier of the State Council of the People's Republic of China Li Keqiang noted that the priority task for 2017 and the 13th Five-Year Plan as a whole is the accelerated implementation of innovations and high technologies, which should replace “old development drivers” and upgrade the economic structure. Thus, the state made it clear that science and production should act in a single team, mutually stimulating the development of each other. In addition, as stated March 3 of this year Minister of Finance of China Xiao Jie, now business will be able to claim a tax deduction of 75% of the amount of investment in research and development.

Li Keqiang's report for the first time noted that China supports the entry into the Chinese stock market of enterprises with foreign capital and their issuance of bonds in the Chinese market, and also allows them to participate in state scientific and technical projects. From now on, when developing standards, participating in public procurement and the “Made in China 2025” program, foreign enterprises will enjoy the same privileges as Chinese enterprises.

Particular attention was paid to the problem of innovative development in a speech by Xi Jinping at the High Level Forum on international cooperation in the framework of the Belt and Road Initiative (Beijing, May 14, 2017). In particular, Xi Jinping said: “we must turn the BRI into a road of innovation. Innovation is an important force that gives impetus to development. The Belt and Road Initiative is new in nature, and we must promote innovation when it is implemented” (Gubaidullina M., Behera A., 2018).

What is especially important, Xi Jinping clearly outlined the most promising areas of innovative research: “We need to promote innovative development and intensify cooperation in advanced areas such as digital economy, artificial intelligence, nanotechnology and quantum computing. We must help the development of “big data”, “cloud”

environment and “smart” cities in order to turn them into the digital Silk Road of the 21st century. We must accelerate the integration of science and technology, introducing them into industry and finance, improving the conditions for innovation and pooling resources. We must create platforms and incubators for young people from different countries in order to promote the development of entrepreneurship in our era of the Internet and help it realize its dreams. We should adhere to new views based on green development, a new lifestyle and work in which green technologies; a low-carbon economy, closed cycles and future needs will take the most important place. Efforts must be made to strengthen cooperation in protecting the environment and creating a sustainable ecosystem in order to achieve the goals set by the “2030 Agenda for Sustainable Development” (Wang, 2019).

It should be noted that from the very beginning of the policy of reforms and openness, China has actively encouraged foreign investment, attracted foreign enterprises in the development of high and new technologies. In 2016, the volume of actually utilized foreign investments in the country exceeded \$ 130 billion. By this indicator, China has maintained its leadership among developing countries.

In addition, China is taking a series of measures to prevent brain drain abroad, as well as to return them to their homeland. In order to service highly qualified foreign and Chinese (people who have studied abroad) specialists, as well as to return to China to engage in scientific activities and open companies, on June 29, 2010 the official website “Plan of a Thousand People” began to function (Wang, L., Zhao, J. 2019).

In particular, on February 27, 2017, prominent scientists Yang Zhengning (physicist) and Yao Qizhi (specialist in computer technology) renounced foreign citizenship and are now becoming academicians of the Chinese Academy of Sciences. This is the first case in history of the transfer of foreign academics to Chinese academics, for which the government of the PRC has specially developed Temporary measures for the adoption of academicians of the Chinese Academy of Sciences with foreign citizenship in Chinese academics. It should also be noted that if 10 years ago the proportion of Chinese graduates from foreign universities who returned home after studying abroad was one third, now about 80% of graduates from foreign universities are returning to China to work (Xiaodong, 2017).

China is one of the world leaders in the creation of supercomputers. Back in 2012-2014. China was the leader in the list of 500 most powerful computers



in the world. The Top-500 ranking, published on June 23, 2014 at the International Supercomputer Conference in Leipzig (Germany), indicated that the Chinese Tiane-2 supercomputer almost doubled the performance of the American Cray Titan (Zhekenov, 2018).

On April 3, 2017, the head of the State Center for Supercomputer Computing in Wuxi, Yang Guangwen, announced that the center he was developing was developing a prototype of a supercomputer based on the Sunway TaihuLight supercomputer (“Shenwei Taihu Zhiguang”). By 2020, the supercomputer will be able to perform a billion billion (exaflops) operations per second. China included the earflaps performance supercomputer development program in the 13th five-year plan for the country’s economic and social development (2016–2020).

In this case we want to underline that our university has signed an agreement with our Chinese partners to get the Supercomputers for Al-Farabi Kazakh National University. During a state visit to the People’s Republic of China, President of Kazakhstan Kassym-Zhomart Tokayev met with President of China Xi Jinping, September, 2019. During the bilateral summit, important interstate documents were signed. Including an agreement between the Governments of the Republic of Kazakhstan and the PRC on cooperation on a project to provide the Kazakhstan side with a supercomputer.

The supercomputer, which will enter the top 500 most productive in the world, will receive the country’s leading university – Al-Farabi Kazakh National University, working on the creation of the international IT technology park of the Silk Road University Alliance, uniting more than 130 higher educational institutions of the world.

The IT-technology Park and the center of supercomputer and cloud computing, created on the basis of the Silicon Valley model, will be located in the High-Tech Zone of Al-Farabi Kazakh National University. Currently, work is underway to prepare the infrastructure and the necessary premises, which will also house the collective use center Industry 4.0 and an exhibition center. The world-class IT technology park being created at Al-Farabi Kazakh National University will become one of the drivers for the implementation of the tasks set by Elbasy to form the IT industry and increase the country’s global competitiveness.

Speaking at the sixth meeting of the Kazakhstan-China Business Council in Beijing, the Head of State emphasized that Kazakhstan is interested in creating

joint innovative enterprises, technology parks and IT centers with Chinese companies.

During the visit to China, the rector of Al-Farabi Kazakh National University, academician Galym Mutanov, met with representatives of well-known high-tech companies and discussed issues of expanding scientific and technical cooperation as part of a government delegation. A memorandum of cooperation in the field of high technologies was signed with Inspur. The parties discussed the implementation of a joint project for the production of high-performance servers, data storage systems and personal computers in the Republic of Kazakhstan, as well as the transfer of advanced digital technologies and scientific research in such areas as Big Data, the Internet of Things, artificial intelligence, cloud technologies, etc. Successful implementation such projects will contribute to the implementation of the state program “Digital Kazakhstan” and will become one of the locomotives for the development of high technology and modernization of the economy.

Today, Al-Farabi Kazakh National University cooperates with 40 universities of the PRC, which became an incentive for further collaboration, which significantly increased students’ interest in learning the Chinese language. For instance, October 2019 at Al-Farabi Kazakh National University held a meeting with the delegation of Shanghai Transport University, headed by the deputy secretary of the party committee, Mr. Cheng Jou. Discussing the prospects for the development of bilateral cooperation in the scientific and educational sphere, the first vice-rector of Al-Farabi Kazakh National University Mukhambetkali Burkitbaev spoke about the directions of the university and familiarized the guests with international projects that are implemented jointly with the best universities in the world.

Also, the joint project of the Academy of Information and Communication Technologies (ICT) HAINA (Huawei Authorized Information and Network Academy) is the result of a fruitful collaboration between Al-Farabi Kazakh National University and Huawei. At present, the Academy’s material and technical base has been created: the company equipped the class with all the necessary IT equipment for conducting classes, provided the opportunity to certify the best students of the course ([www.kaznu.kz](http://www.kaznu.kz)).

In addition, on May 3, 2017, it became known that scientists from the Chinese University of Science and Technology built a new quantum computer. Academician Pan Jianwei, a Chinese scientist in the field of quantum physics, said that

the sampling rate of a prototype quantum computer is 24,000 higher than that of its international counterparts. At the same time, the execution speed of the classical prototype algorithm is 10-100 times faster than the computing speed of the world's first electronic computer (ENIAC) and the

first transistor computer (TRADIC). This is the first quantum computer created on the basis of single photons and surpassing early classical computers. The prototype will pave the way for the creation of a quantum computer, which will be more advanced than classical computers.



In 2014, Xi Jinping made a speech at the Chinese Academy of Sciences about the upcoming robot revolution, which will transform China and then the whole world. The Chinese government sets the task of accelerating the introduction of big data (Big Data), cloud computing (cloud computing), and the Internet of things (Internet of Things) in Chinese companies and focusing on the creation of “intelligent factories”.

According to the International Federation of Robotics (IFR), back in 2015, the Chinese market for industrial robots outperformed the Japanese and became the largest in the world [20], maintaining these positions in 2016-2017. IFR Director of Statistics Gudrun Litzenberger claims that there are currently hundreds of thousands of professional service robots in the world, as well as 1.5 million industrial robots – almost 1.5 million. The USA holds the first place in the field of service robots, while industrial robots are leading China. By the

level of robotization, South Korea is still the leader.

President of the National Association of Robotics (RF) Market Participants V. Nedelsky said on April 17 this year: “China rushed into robotics 10 years ago, and over the past five years there has been a tremendous amount of purchases. But besides this, they grow their own Chinese companies that make robots”. According to him, while China controls 20% of its robotics market.

By the way, the national strategy “Made in China 2025” (“Made in China 2025”) suggests that China should achieve leadership in advanced manufacturing technologies, partly through the aggressive acquisition of foreign companies. An example of such a transaction is the purchase by the Chinese company Midea Group of the German manufacturer of industrial robots Kuka in 2016.

By 2022, the level of production robotics in China’s manufacturing industry will grow by 150%. This forecast is contained in the report “Industrial

Robots of China”, prepared by the international research and consulting company IDC. According to the head of the research department of IDC, Zhang Jingbin, the development of the use of robotics in the PRC is facilitated by the constant increase in labor costs, an aging population, international competition and government policy in this area (Warren, 2010).

It should be noted that China occupies a leading position in the world in the field of creating bionic robots. In particular, March 31 this year Beijing Aerospace University (Beihuan University) together with foreign partners created a soft-bodied octopus robot, which can be used in industry, medicine, as well as in the field of medical rehabilitation and in the service sector (Jacques, 2012).

According to Liu Lihua, Deputy Minister of Industry and Informatization of the PRC, China has entered the forefront in the world in the study of artificial intelligence technologies. Liu Lihua recalled that the MIT Technology Review magazine published a list of 10 global breakthrough technologies in 2017, including current technologies in the field of artificial intelligence, and the main researchers in this field include Chinese enterprises iFLYTEK, Alibaba Group, Baidu et al. We also note that in March 2017, Yale announced the creation of the China Foundation for Emotional Intelligence at Yale University to promote research in this area and the practical implementation of education based on emotional intelligence (Clarke, 2017).

## Conclusion

Due to all information that we could collect and analyze, we can conclude the under mentioned conclusions and generalizations.

The first one; China systematically, purposefully and consistently implements state policy in the field of science and technology, skillfully combining market mechanisms and the remaining elements of a planned economy, as well as using tax incentives to encourage innovation policies of domestic corporations. Kazakhstan has to learn a lot of things

from the experience of Chinese concept in relation to science and high-tech. Especially, when COVID-19 pandemic showed us the importance of science and digitalization.

The second one; China, as the largest developing power, is rapidly reducing its technological gap from the developed countries of the West. The dynamics of Chinese progress are such that the United States, Japan and the European Union are seriously concerned about the possible technological dominance of China on the world stage in the medium term. In this case, we have to know that China is a main partner and investor for Kazakhstan in the field of digitalization and technology. We have to attempt to sign many agreements in this direction and try to attract Chinese investment to Kazakhstan market using joint project Nurly Zhol and BRI.

The third; The US and the European Union are concerned that in recent years, China has been actively investing in high-tech Western startups related to the conduct of the war in the future (drones, robots, artificial intelligence, etc.), but the West simply does not completely abandon Chinese investments in these areas.

The last one; we must not forget that the key to the prosperity of any state is not only economic opportunities and natural wealth, but also its spiritual heritage, the intellectual potential of its citizens. The underestimation of culture and science leads not only to a significant impoverishment of civilization as a whole, but also to the emergence of conflicts and misunderstandings. We want to emphasize, BRI is a great opportunity to increase cooperation in the field of science and technology as we can see from the historical lessons from the past of Great Silk Road. It is a great revival of Chinese science in XXI century and we have to take a benefit from it.

Nevertheless, it does not mean that BRI has only opportunities and benefits, it has threats and challenges not only for all participants but even for China it has. The first challenge, it is necessary to strengthen the position of the new concept in the context of justice and mutual benefits.

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